LEGISLATIVE SERVICES AGENCY
OFFICE OF FISCAL AND MANAGEMENT ANALYSIS

301 State House
(317) 232-9855

FISCAL IMPACT STATEMENT

LS 6370 **DATE PREPARED:** Jan 22, 2001
BILL NUMBER: SB 169 **BILL AMENDED:**

SUBJECT: EQSC and Wetland Inventory.

FISCAL ANALYST: Bernadette Bartlett
PHONE NUMBER: 232-9586

FUNDS AFFECTED: **X** **GENERAL** **IMPACT:** State
DEDICATED
FEDERAL

Summary of Legislation: This bill reestablishes and extends the Environmental Quality Service Council (EQSC) through December 31, 2003. It directs the Department of Environmental Management (IDEM) and the Department of Natural Resources to conduct an inventory of all wetlands in Indiana by July 1, 2003. The bill makes an appropriation to the Department of Environmental Management to conduct the inventory. It repeals the current EQSC enabling statute (which expires December 31, 2000).

Effective Date: Upon passage; July 1, 2001.

Explanation of State Expenditures: (Revised) This proposal has two cost components. First, reestablishing the EQSC will result in a maximum expenditure per year of $18,500. This amount is the maximum budget allocated to legislative study committees composed of at least 16 members. (The EQSC consists of 24 members.) Legislative Services Agency will also provide staff to the Council; however, the Agency will incur no additional expenses because it currently provides staff to the Council.

The bill also directs IDEM to conduct an inventory of all wetlands in Indiana and prepare a report of the inventory conducted. IDEM does not have the resources necessary to conduct the inventory and would contract for the project. Expenses for the inventory are to be taken from IDEM's budget. The bill appropriates to IDEM's Office of Water Management an amount sufficient to conduct the inventory. Money is to be appropriated from the State General Fund beginning July 1, 2001, and ending June 30, 2003. Money appropriated for the inventory does not revert to the State General Fund at the end of any state fiscal year. IDEM would prepare the report in-house with existing resources. In order to estimate the costs to conduct a state-wide wetlands inventory, IDEM worked with representatives of Indiana University, School of Public and Environmental Affairs, Bloomington.

Background. In the 1980's, the U.S. Fish and Wildlife Service and the Department of Natural Resources created National Wetland Inventory (NWI) maps for Indiana. These maps depict areas that meet a set of

criteria established for this project. The NWI maps are somewhat limited in usefulness, as the level of detail was minimal, errors occurred in the mapping process due to the need to transpose data by hand to map sheets, and little or no field verification of data was possible. The NWI is currently the only comprehensive inventory of wetlands in Indiana. The limitations of the NWI maps extend into all aspects of wetlands, from regulatory programs to natural resource assessments; little is known about the status of state wetlands, the relative acreage of wetlands, and how wetlands are changing as a result of regulated and non-regulated activities. IDEM recommends using a more modern means of conducting the wetlands inventory using remote sensing.

IDEM has compiled information on three options. Each option would use modern remote sensing (information gathered from satellites) and would be analyzed by computers after a comprehensive model is developed. Model development will require a focused, in-the-field study of wetlands to refine analytical procedures and verify the accuracy of the model. This basic model has been used throughout the world to assess various types of natural resources and is the most cost-effective method to achieve the goals of the project.

It is important to note that none of the three options will produce maps or information that will conclusively and definitively locate wetlands on the landscape and precisely define the borders of wetlands. Wetland ecosystems, by their very nature, fluctuate based on water levels, vegetation, and proximity to other water bodies. While these inventories would allow persons to determine if wetlands existed on a given piece of property, the wetland would still need to be verified on the ground at the subject property by a wetland professional. For regulatory purposes, the boundaries of the wetland must still be determined using the current field methods in the federal delineation manual. Wetland inventories are planning tools and should never be used as a substitute for precise field methods.

The options and associated costs represent the most cost-effective methods for answering questions about the extent, location, and types of wetlands present in Indiana. The options use two types of remotely sensed multispectral imagery data which are currently available: IKONOS (Carterra) data from SpaceImaging, and Landsat7 (ETM+) data from NASA.

Methodology will be developed and documented to facilitate periodic updates and change detection. The classification will have three levels:

(a) wetland – non-wetland discrimination,

(b) open water / herbaceous / shrub-scrub / and forested,

(c) differentiation between wetland types in the four categories in (b), wherever possible.

COST TO CONDUCT INVENTORY OF WETLANDS IN INDIANA USING REMOTE SENSING			
	Option 1 Low Resolution	**Option 2 Dual Resolution**	**Option 3 High Resolution**
Images and computer service for imaging processing:	58,000	315,229	5,496,000
Equipment:	22,200	24,600	44,400
Salaries and Benefits:	643,782	746,782	977,782
Travel & Lodging:	24,010	24,010	23,510
Other Costs:	36,000	36,000	36,000
Total Cost:	783,992	1,146,621	6,577,692

Images: Costs for imagery is based upon the following rates: $600 / scene for Landsat7 ETM+ data; 10 different scenes are needed to fully cover Indiana. Three dates will be used. The cost for IKONOS Carterra Map data (1-m pan and 4-m multispectral data) are based upon total acreage in the order: $28.97 / km^2 for Option 2, and $34.38 / km^2 for Option 3.

Other Costs: consumable supplies, communications (long distance calls, fax), copy service, publication charges.

The main difference in costs for the three options is the cost of the data from remote sensing imagery. The costs of the data varies for two reasons:

1) One proposal obtains data from NASA, a public agency, while the other two proposals obtain data from Carterra, a privately owned remote-sensing corporation.
2) One set of data has a relatively low resolution (it cannot see wetlands that are less than 1/8 of an acre in size) while the other set of data can see wetlands at a very high resolution (it can discern wetlands from other objects as small as one square meter).

The three imaging options are summarized as follows:

Option 1: Low Resolution. This option uses NASA's LANDSAT 7 data. The classification will be based upon three sets of imagery each from a day-of-year in which different wetland types can be distinguished This data will only see wetlands that are 1/8 of an acre or greater in size, which means that some wetlands will not appear on the inventory. Current environmental regulations apply to all wetlands, even those smaller than the size that the LANDSAT 7 can accurately discern. Also, as the size of the wetlands becomes closer to this lower limit, the more likely the data will not accurately depict the location and the relative edges of that wetland. Small wetlands may be difficult to classify. The survey is still useful and provides important information to regulatory agencies, citizens, and business persons. It is a cost-efficient solution to the basic problem.

Option 2: Dual Resolution. This option uses a combination of LANDSAT 7 data and imagery from Carterra's IKONOS satellite. The IKONOS images would be acquired for several areas in the state where

wetland concentrations are relatively high and where growth of communities is relatively rapid: northwest Indiana, around Fort Wayne in Allen County, and northern Marion and southern Hamilton Counties. The highly detailed IKONOS information would be used to insure that smaller, fragmented wetlands in these high growth areas were accurately identified and mapped. This allows for both local urban planning and watershed restoration planning in these areas of relatively heavy change. However, this information would not be available for the entire state, which means that smaller wetlands in other portions of the state may not be mapped or possibly misclassfied. Option 2 targets resources in areas of rapid change, answers the basic questions, but does not provided detailed information for the entire state.

Option 3: High Resolution. This option uses information obtained exclusively from Carterra's IKONOS satellite. The highly detailed IKONOS images would allow the most comprehensive assessment of Indiana's wetlands – virtually all wetlands in the state, regardless of size, could be accurately located and classified. Carterra's data is much more expensive, but has a much higher resolution than NASA's LANDSAT 7 data. The information would be useful for project planning, as all users would have high assurances that wetlands depicted on maps generated by this proposal were in the locations depicted and were of the type and size indicated on the maps. This proposal provides the best information for planning the management of wetland resources in the state.

Although Option 3 carries a substantial cost for the data needed to perform the survey, there are numerous benefits to acquiring this information. First, the price of this data can be negotiated: Indiana would be the first state to purchase a complete set of images from Carterra and Carterra has indicated to IDEM in other conversations an interest in working with the state to accomplish this goal. Second, Indiana would be purchasing this data and the right to distribute this data to other units of government and organizations. Indiana could charge for this service or make information available in any manner it deems prudent. Third, and most important, this information is useful for numerous tasks. Due to the high level of detail, this information can be used by mass transit agencies to map existing infrastructure, by local planning boards to evaluate areas of potential growth, by natural resource agencies to assess the health of various ecosystems, as examples. Indiana currently has a Data Processing Oversight Commission that has expressed an interest in being the repository of this information and can identify additional uses. Option 3 can be viewed as having two key products – a comprehensive wetland inventory and a foundation for a modern Geographic Information System (GIS) and planning infrastructure. The cost for the Indiana Department of Administration to house and disseminate the data would be between an estimated $60,000-$100,000 per year.

Explanation of State Revenues:

Explanation of Local Expenditures:

Explanation of Local Revenues:

State Agencies Affected: Department of Environmental Management, the Department of Natural Resources, and the Legislative Services Agency.

Local Agencies Affected:

Information Sources: Erika Seydel Cheney, Director of the Office of Business and Legislative Relations, IDEM, (317) 232-8598.